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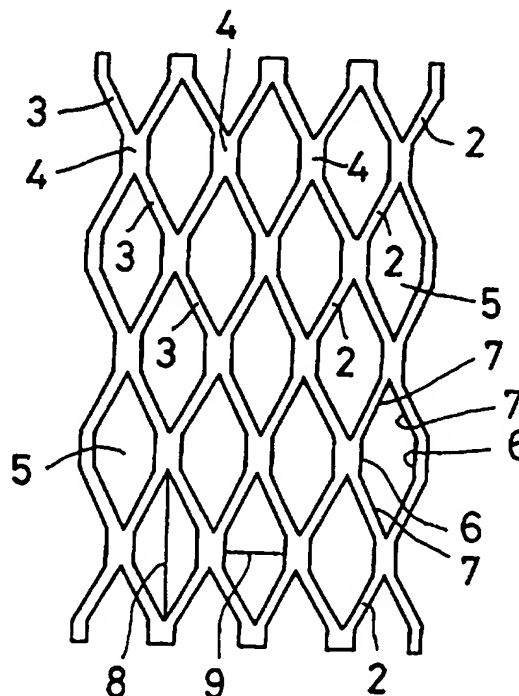
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(21) International Application Number: PCT/SE97/00235 (22) International Filing Date: 14 February 1997 (14.02.97) (30) Priority Data: 9600642-4 21 February 1996 (21.02.96) SE (71) Applicant (for all designated States except US): PELTOR AB [SE/SE]; P.O. Box 2341, S-331 02 Värnamo (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): NORDIN, Henrik [SE/SE]; Bosgårdsvägen 4, S-330 12 Forsheda (SE). (74) Agent: WALLENGREN, Yngvar; Patentbyrå Y Wallengren AB, P.O. Box 116, S-331 21 Värnamo (SE).	(81) Designated States: CA, DE, DE (Utility model), NO, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>	

(54) Title: A SAFETY VISOR

(57) Abstract

A safety visor is designed so as to protect a wearer's face, in particular the eyes, from flying particles such as sawdust, and also pointed objects such as twigs. The safety visor includes a grill network with two groups of grill bars (2, 3) or wires. The grill bars or wires in the one group intersect the grill bars or wires in the second group. The safety visor is made of expanded metal. The grill network (1) has apertures (5) whose form approximates that of a parallelogram or a rhomb.

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A SAFETY VISOR

TECHNICAL FIELD

- 5 The present invention relates to a safety visor which is designed so as to protect a user's face, in particular the eyes, from flying particles such as sawdust, and also pointed objects such as twigs, and which includes a grill with two groups of grill bars or wires, the grill bars or wires in the one group intersecting the grill bars or wires in the second group.

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BACKGROUND ART

- 15 In forestry work, safety visors are often employed to prevent flying particles such as sawdust from a chain saw from hitting the worker's face, and in particular his eyes. The same safety visor also affords protection against impact from pointed objects such as twigs, which could injure the eyes. Safety visors of this type are often mounted on a safety helmet or ear protectors and are placed immediately in front of the wearer's face and eyes.
- 20 As safety visors in the above-outlined practical application, there occasionally occur visors produced from transparent plastic material. Such visors provide adequate safety and field of vision and do not permit any penetration whatever of flying particles in to the face of the wearer.
- 25 However, safety visors of this type suffer from drawbacks, not least including the formation of mist. In addition, scratches in the material of the visor, dirt or rain drops may cause reflections and give considerable reduction in visibility through the visor.
- 30 Safety visors are also previously known in the art which are manufactured from woven metal wire mesh in which the different wires in the mesh intersect one another. With a suitable wire diameter, wire gauge and design of the apertures in the mesh, a very good safety effect can be attained vis-à-vis flying particles. However, safety visors produced from wire mesh suffer
- 35 from the drawback that they manifestly obstruct the view of the wearer, since the wires constitute quite a large proportion of the total surface area of

the visor. A certain improvement in light admission, and thereby visibility through such a visor may be obtained by a reduction of the wire diameter, but this improvement must be bought at the cost of poorer stability and mechanical strength. Thus, it is not uncommon that visors produced from wire mesh may easily be penetrated by pointed objects such as twigs and the like, since the wires in the mesh slide in relation to one another.

Visors produced from wire mesh also cause problems such that small gaps are formed in the interstices between wires in the mesh, and these gaps may, because of capillary action, retain relatively large quantities of water in wet weather. Such amounts of water bonded by the wire mesh may have an impeding effect on visibility through the visor, and, in addition, help to dirty the visor.

Such visors produced from wire mesh may also give rise to problems in counter light situations since the individual wires in the mesh (because of their large surface area and diameter) cause reflections which impede visibility through the visor.

One example of a safety visor produced from such a wire mesh is given in SE-B-454 237.

PROBLEM STRUCTURE

The present invention has for its object to design the safety visor mentioned by way of introduction such that it obviates the drawbacks inherent in prior art safety visors. In particular, the present invention has for its object to realise a safety visor which possesses superior mechanical strength, in particular against penetration by pointed objects. The present invention also has for its object to realise a safety visor in which the apertures of the grill may be given expedient shape in terms of penetration by randomly oriented particles of irregular shape. The present invention yet further has for its object to realise a visor which may create a "venetian blind effect" and thereby obviate or at least reduce problems in situations when the wearer is looking into the light. Finally, the present invention has for its object to realise a safety visor which is simple and economical to manufacture and

which affords improved light admission in that the grill included in the visor takes up a minimum proportion of the surface of the visor.

SOLUTION

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The objects forming the basis of the present invention will be attained if the safety visor intimated by way of introduction is characterized in that the safety visor is made of expanded metal.

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Further advantages will be attained if the subject matter of the present invention is also given one or more of the characterizing features as set forth in appended subclaims 2 to 8.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

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The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

20

Fig. 1 shows a small section of a safety visor produced according to the present invention;

Fig. 2 shows a modified form of a safety visor according to the present invention; and

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Fig. 3 is a sectional view illustrating the "venetian blind effect" which is realised employing the embodiment according to Fig. 2.

DESCRIPTION OF PREFERRED EMBODIMENT

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The section from a safety visor according to the present invention, illustrated in Fig. 1 comprises a grill network with two groups of mutually intersecting grill bars or wires. In the Figure, the one group of grill bars of the grill network 1 carries reference numeral 2, while the second group of grill bars carries reference numeral 3. It will be apparent from the Figure that the first group of grill bars 2 is directed from the upper, right-hand corner of the

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Figure down towards its left-hand lower corner, while the second group of grill bars is directed from the upper, left-hand corner of the Figure down towards its lower, right-hand corner. The grill bars in both groups therefore intersect one another at a number of interstices 4 where the mutually
5 converging grill bars are united by being of one piece manufacture. The major advantage will hereby be afforded that the grill bars can be given reduced dimensions while retaining stability, because the grill bars in the one group cannot slide in relation to the grill bars in the other group. In addition, as a result of the integral interstices 4, there are no gaps in which
10 water may accumulate by capillary action.

One example of a grill network of the above described type is produced in that a thin metal plate is provided with a large number of parallel rows of slots longitudinally directed along the rows. In such instance, the slots in one
15 row are located in register with the interval spaces between the slots in adjacent rows. The material which is located between adjacent slots is extended simultaneously with the provision of the next row of slots, whereafter the thus slotted plate is drawn out or made planar so that a grill network of generally designated expanded metal is thereby formed. The
20 manufacture thus takes place by means of combination of cutting (provision of the slots) and plastic processing (expansion or extension of the material) of a plate metal material.

The expanded metal is often rolled to a flat state, which is illustrated in Fig.
25 1. This implies that the individual grill bars 2 and 3 have substantially rectangular cross section whose edge lines will be approximately parallel with or at right angles to the plane of the Drawing, respectively, whereby the side of such a grill bar facing towards the observer of Fig. 1 is substantially parallel with the plane of the Drawing. The interstices 4 in such a rolled
30 expanded metal will be of a more complicated configuration but may, essentially, be considered as planar and rectangular in cross section.

The shape of the apertures 5 in the grill network which is shown in Fig. 1 may be described as hexagonal with two, opposing and parallel edges 6. The
35 length of these edges corresponds approximately to the length of the interstices 4. The other, longer edges 7 of the apertures 5 are pairwise parallel

with one another or approximately pairwise parallel with one another and would, if they were extended, form the side edges of a parallelogram or a rhomb.

- 5 On condition that the above mentioned interstices 4 are made as short as possible, i.e. that the edge lengths 6 are minimised as far as it is technically possible, the shape of the apertures 5 may also be described as approximating that of a parallelogram or possibly that of a rhomb.
- 10 The apertures 5 in the grill network 1 have two axes which are at right angles in relation to one another, namely a major axis 8 and a minor axis 9. The relationship between the length of the major axis and the length of the minor axis is of the order of magnitude of 1-3.5, in which the relationship 1 would imply that the apertures 5 are square in shape (in this instance the square
- 15 being considered as a special case of the rhomb).

By varying the slot length of the slots provided on production of the expanded metal, and by varying the distance between adjacent slots and varying the distance between adjacent rows of slots, it is possible within very

20 broad limits to influence the shape of the grill network, its grill bars 2 and 3 and its apertures 5.

In such cases when the visibility properties of the visor are to be optimised for short range viewing, it is advantageous to dispose the major axis 8 of the

25 apertures 5 approximately vertical in the position of use of the visor.

Fig. 2 shows an alternative embodiment of the subject matter of the present invention. In this embodiment, the grill network 1 has not been rolled flat but instead the grill bars 2 and 3 included in the grill network remain in

30 those positions which they assumed on manufacture. This entails that, in the small section of the grill network which is shown in Fig. 2, those end surfaces 10 which have been realised by cutting the grill network through the interstices 4 at the right-hand edge of the section will be obliquely inclined in relation to the plane of extent 11 and 14 of the grill network, where reference

35 numeral 11 relates to the inside of the visor while reference numeral 14 relates to its outside. In the lower section of Fig. 2, the thickness of the grill

network is intimated at right angles to the plane of extent 11 and 14 by the line 12. It should be observed that each sectional surface through any optional interstice 4 parallel with any of the illustrated end surfaces 10 will have the same size, configuration and orientation as that end surface.

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The left-hand section of Fig. 2 shows the end surfaces 13 of the grill bars 2 and 3 which have been cut on making the small section according to Fig. 2. It will be clearly apparent that these end surface 13 are obliquely inclined in relation to the plane of extent 11 and 14 of the grill network in approximately the same manner as the end surfaces 10. It will further be apparent from the left-hand section of Fig. 2 that the end surfaces 13 are located approximately centrally in the thickness 12 of the grill network, since these surfaces are approximately located at the centre points of the grill bars 2 and 3 and the grill bars alternately extend from the inside 11 of the visor to its outside 14. It should here also be observed that each cut surface through any optional grill bar 2 or 3 parallel with any of the end surfaces 13 will have the same size, shape and orientation as that end surface.

It will still further be apparent from Fig. 2 that the grill bars 2 and 3 and also the interstices 4 have substantially rectangular cross section corresponding to the end surfaces 10 and 13. In this instance, the cross sections have longer edge lines 15 and 16, as well as shorter edges lines 17 and 18, respectively. It will yet further be apparent from the Figure that the longitudinal direction of the cross sections and thereby the long edge lines 15 and 16 make an acute angle α with the plane of extent 11 of the visor. Correspondingly, the shorter edge lines 17 and 18 make an acute angle β with the plane of extent 11 of the visor. It applies here that $\alpha + \beta = 90^\circ$.

As a result of the above described oblique inclination of the longer edge lines 15 and 16 for the grill bars 2 and 3, as well as the cross section of the interstices 4 in relation to the plane of extent 11 of the visor, there will be achieved a "venetian blind effect", which implies that light admission through the visor is considerably much better if the light enters obliquely from beneath (looking obliquely downwards, i.e. short range viewing) than obliquely from above. This is clearly apparent from Fig. 3.

In Fig. 3, the angle $\alpha = 20^\circ$ and the angle $\beta = 70^\circ$, which implies that the longer edge lines 15 in the cross section of the grill bars incline approximately 20° downwards in a direction from the inside of the visor to its outside if the plane of extent 11 of the visor is approximately vertical.

- 5 With the dimensioning and geometry of the visor exemplified in the Figure, maximum light admission will be achieved for light rays 20 which enter approximately 20° from beneath towards the eye 19. This corresponds to viewing at relatively short range. In this case, the grill network 1 only blocks out approximately 19 per cent of the impinging light, since the distance a-b is
10 approximately 19 per cent of the distance a-c.

Of the light rays 21, 22 and 23 which impinge in approximately 20° from above, roughly 50 per cent will be blocked off, since the distance d-e is approximately 50 per cent of the distance d-f.

- 15 If the angle of inclination of the impinging light is increased, the proportion blocked out will increase. At an angle of impingement of approximately 40° (see the light ray 24), the proportion blocked out will be approximately 67 per cent.

- 20 At the bottom in Fig. 3, it is shown how a light ray 24 which impinges from approximately 40° from above is reflected by the surfaces 15 of the grill bars. In complete analogy, light rays which impinge steeply from above (for example like the light rays 21 - 23) will be reflected if they impinge upon the
25 defining surfaces 15 of the grill bars. In all likelihood such reflected light as passes through the visor will in practice be negligible, since the grill bars have a surface coating (for example black matte) which both absorbs light and dissipates on reflection.

- 30 If the angle α is increased, it is possible to reach a situation in which the light ray 24, after a first reflection in the surfaces 15 of the grill bars, does not impinge upon the superjacent grill bar, but is reflected back out to the exterior of the visor.

- 35 On viewing at short range, the wearer of the visor will as a rule bow his head forwards and downwards. This implies that, in Fig. 3, the upper portion of

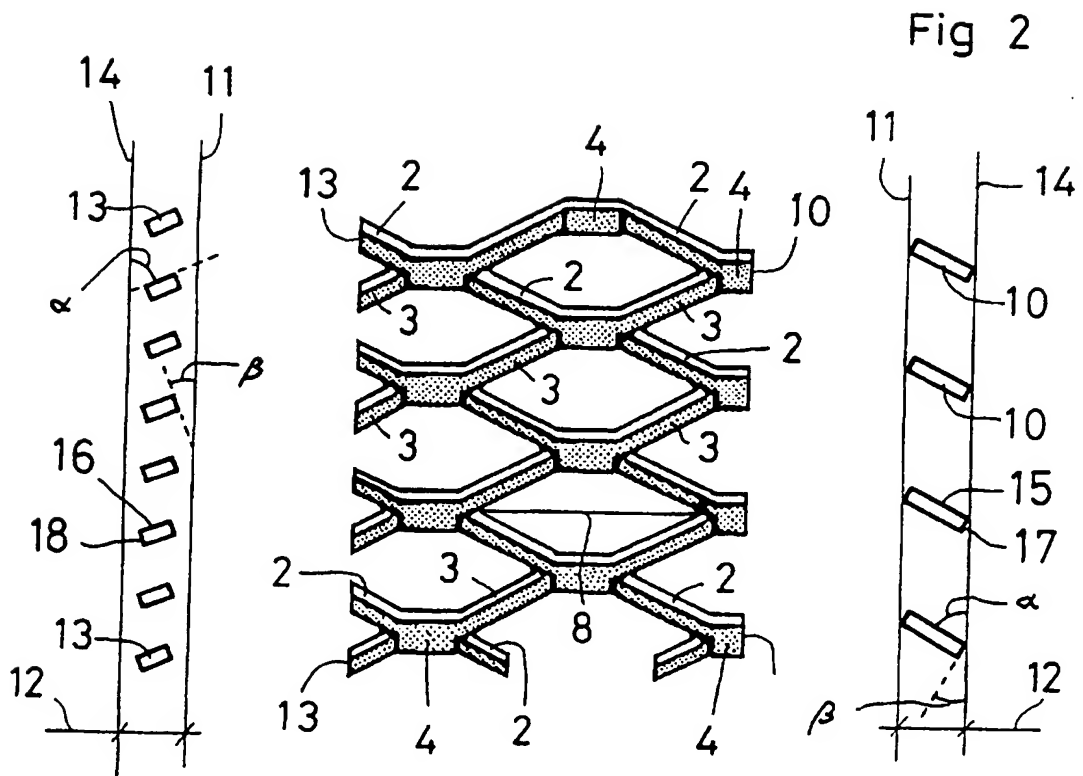
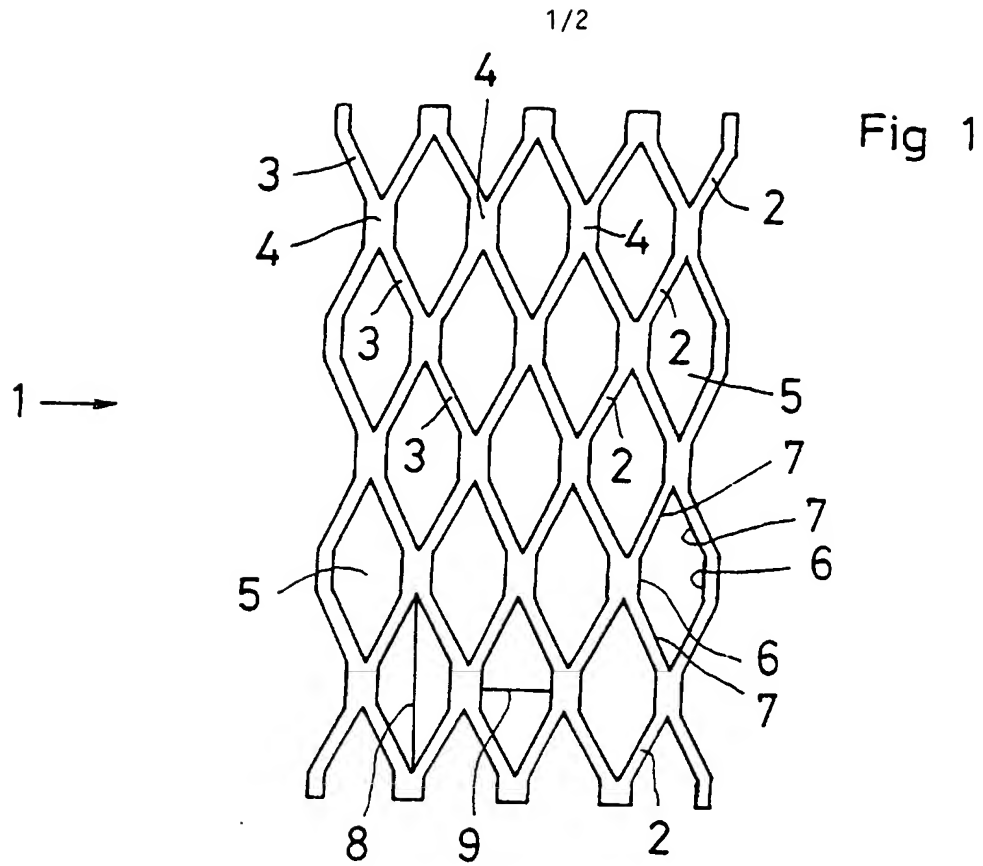
the safety visor will be pivoted over to the right. Regarding the light reflection in the surfaces 15 of the grill bars, this will have the same effect as if the angle α had been increased or as if the angle of impingement of the light ray 24 had been increased. The result will be, already at a very slight
5 bowing of the head, that light impinging from above is reflected out to an extremely high degree.

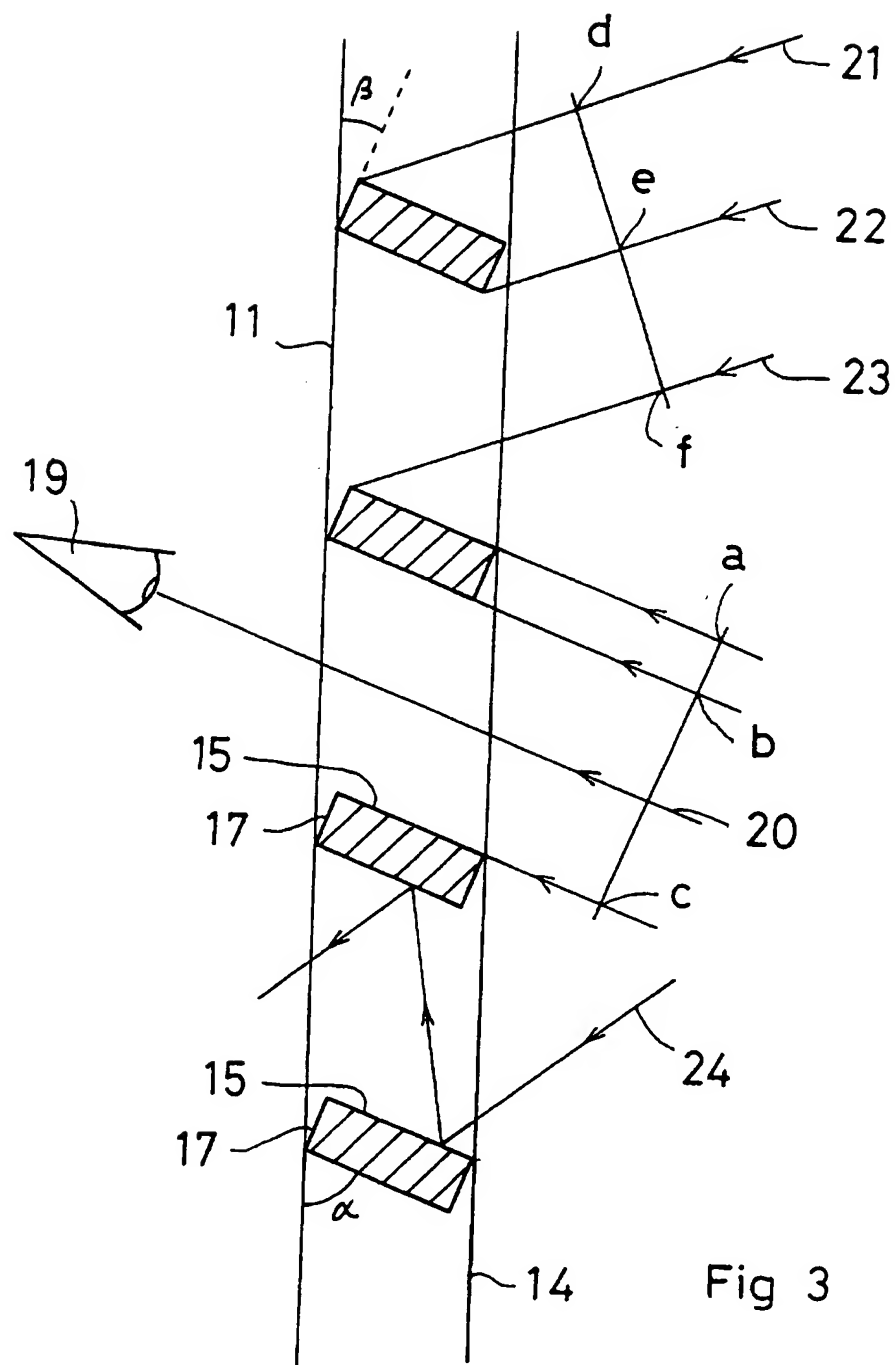
The present invention may be modified without departing from the spirit and scope of the appended Claims.

WHAT IS CLAIMED IS:

1. A safety visor which is designed so as to protect a user's face, in particular the eyes, from flying particles such as sawdust, and also pointed objects such as twigs, and which includes a grill network with two groups of grill bars (2, 3) or wires, the grill bars or wires in the one group intersecting the grill bars or wires in the second group, characterized in that the safety visor is made of expanded metal.
2. The safety visor as claimed in Claim 1, characterized in that the grill network (1) has apertures (5) whose configuration approximates that of a parallelogram or a rhomb.
3. The safety visor as claimed in Claim 1, characterized in that the grill network (1) has apertures (5) whose configuration approximates that of a hexagon, the hexagon having two opposing sides (6) which are substantially shorter than the remaining sides (7).
4. The safety visor as claimed in any of Claims 1 to 3, characterized in that the apertures (5) of the grill network (1) have a major axis (8) and a minor axis (9) approximately at right angles thereto, the relationship between the length of the major axis and the length of the minor axis being of the order of magnitude of 1-3.5.
5. The safety visor as claimed in any of Claims 1 to 4, characterized in that the grill bars (2, 3) or wires have cross sections which are approximately rectangular, possibly square, the edge lines of the cross section making acute angles (α , β , respectively) with the plane of extent (11, 14) of the safety visor.
6. The safety visor as claimed in any of Claims 1 to 4, characterized in that the grill bars (2, 3) or wires have cross sections which are approximately parallelogram shaped, possibly rhomboid, the cross sections having two opposing edge lines which make an acute angle with the plane of extent (11) of the safety visor.
7. The safety visor as claimed in any of Claims 4 to 6, characterized in

- that in the position of use of the safety visor, the major axes (8) of the apertures (5) are substantially vertical.
8. The safety visor as claimed in any of Claims 4 to 6, characterized in
- 5 that in the position of use of the safety visor, the major axes (8) of the apertures (5) are substantially horizontal.





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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/00235

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A42B 3/22, A61F 9/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A42B, A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4831665 A (L. PALMAER), 23 May 1989 (23.05.89) --	1
A	US 4826344 A (D.B. RAKIEC), 2 May 1989 (02.05.89) -- -----	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

02/04/97

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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